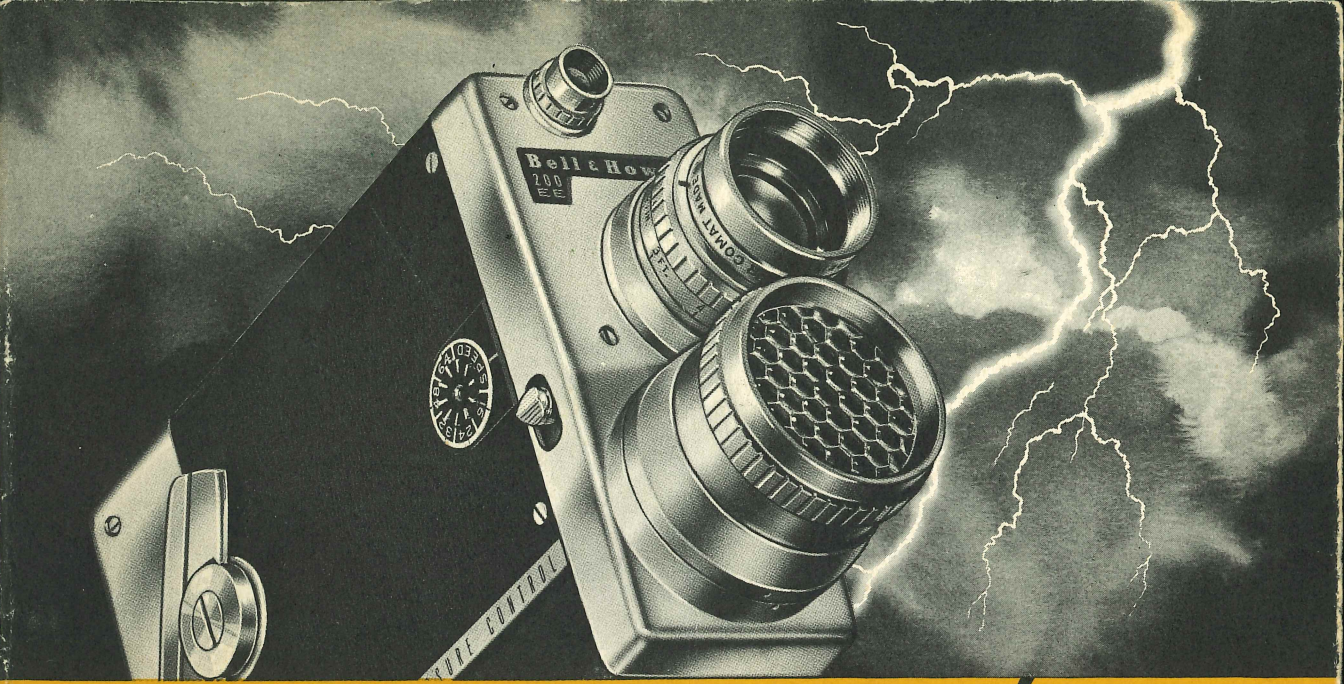
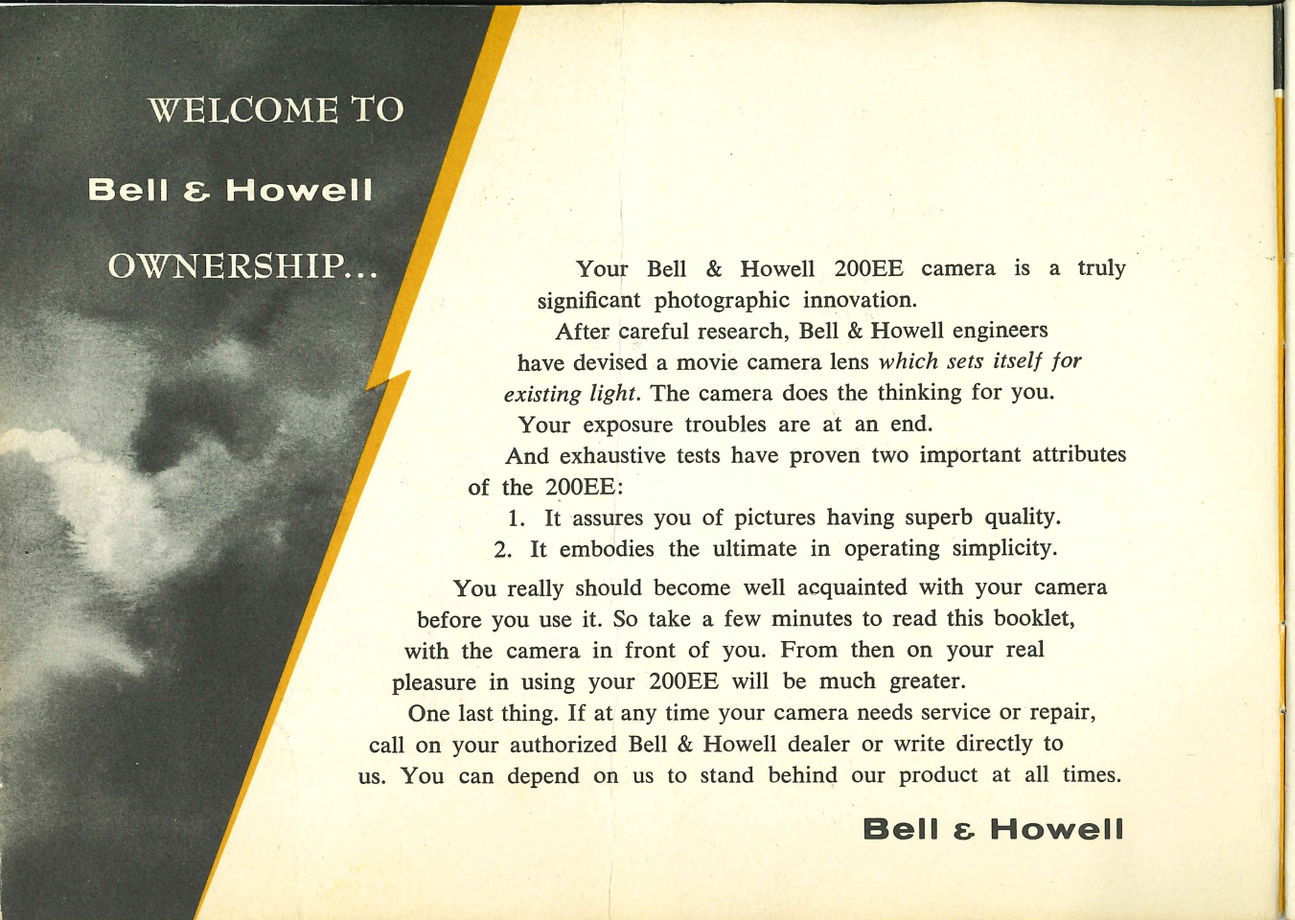


MOVIE MAGIC with your **Bell & Howell 200EE**

ELECTRIC EYE magazine-load 16mm camera



WELCOME TO Bell & Howell OWNERSHIP...

Your Bell & Howell 200EE camera is a truly significant photographic innovation.

After careful research, Bell & Howell engineers have devised a movie camera lens *which sets itself for existing light*. The camera does the thinking for you. Your exposure troubles are at an end.

And exhaustive tests have proven two important attributes of the 200EE:

1. It assures you of pictures having superb quality.
2. It embodies the ultimate in operating simplicity.

You really should become well acquainted with your camera before you use it. So take a few minutes to read this booklet, with the camera in front of you. From then on your real pleasure in using your 200EE will be much greater.

One last thing. If at any time your camera needs service or repair, call on your authorized Bell & Howell dealer or write directly to us. You can depend on us to stand behind our product at all times.

Bell & Howell

CONTENTS

INTRODUCTION

Ever notice the iris of the human eye? In the presence of bright light it contracts to a very small diameter. In dim light it opens wide. It does these things automatically, by means of muscles which act upon impulses originating with the optic nerve.

The iris of a camera lens is, in principle, like that of the human eye, except that it must be closed or opened by somebody or something—it cannot adjust itself to existing light conditions. When adjusted properly, the lens iris passes the right amount of light for proper exposure of the film within a given time interval.

For years the photoelectric exposure meter has been used by experts as a guide for setting the camera lens iris, or diaphragm, accurately for correct exposure of a given subject. You take your meter reading, then set the lens accordingly. But now Bell & Howell has built the photoelectric cell right into a camera—the 200EE—linking it to the lens iris so that the lens *sets itself automatically* as you make movies. A tiny, but sturdy, battery-operated motor inside the camera housing translates the photocell's electrical impulses into sufficient power to open or close the lens as needed.

There—in brief—is the story of your 200EE camera—the camera which will render your movie making simpler and more enjoyable than you ever imagined it could be.

IRIS OF HUMAN EYE

opened wide in dim light

closed down in bright light

WANT TO GET STARTED *RIGHT NOW?*

here's how...

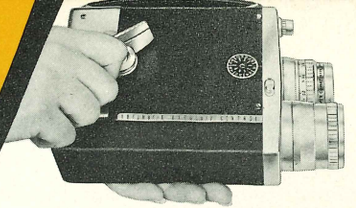
1 WIND. Turn the easy-winding ratchet key back and forth until it stops.

2 LOAD. Open camera door. Insert film magazine. Close camera door.

3 SET CONTROL BARREL. Set the control barrel for the film speed and the camera speed you're going to use. *Your dealer can do this for you.*

4 FOCUS LENS. Most of the time you can set the lens at the universal-focus position and leave it there.

5 SIGHT and SHOOT. View your subject through the finder. Press the button *in* until the lens iris ring stops moving. Then press the button *down* — and you're making properly-exposed movies.



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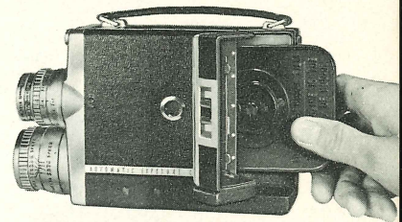

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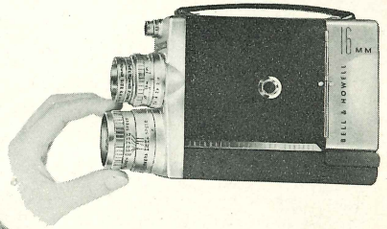

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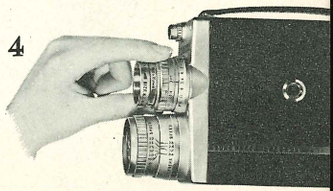

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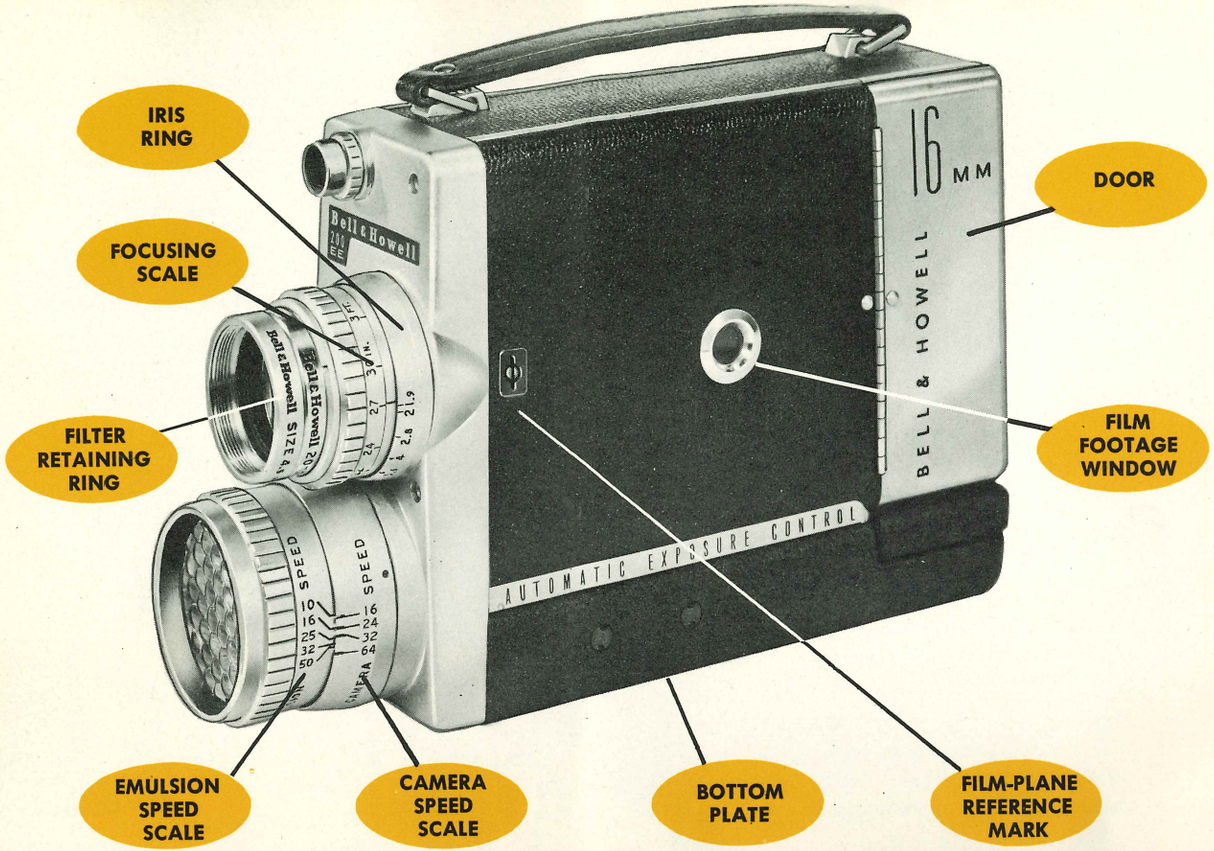
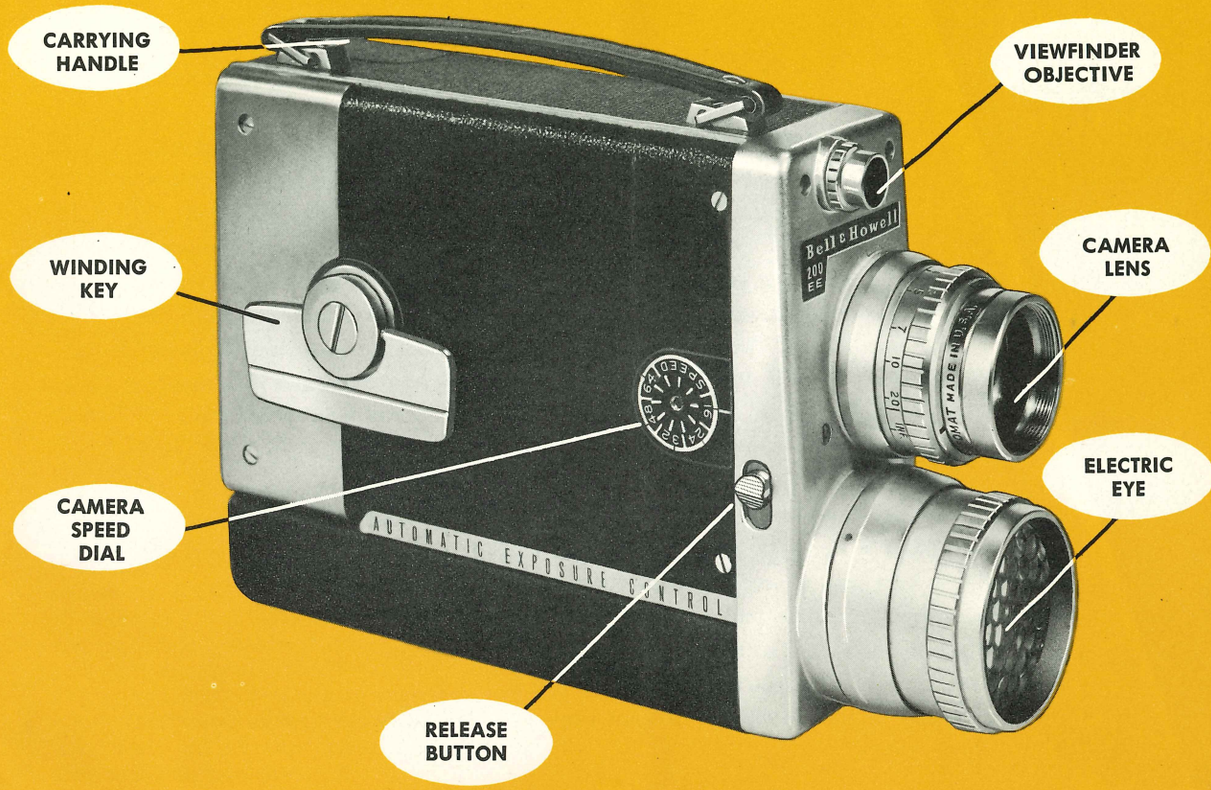
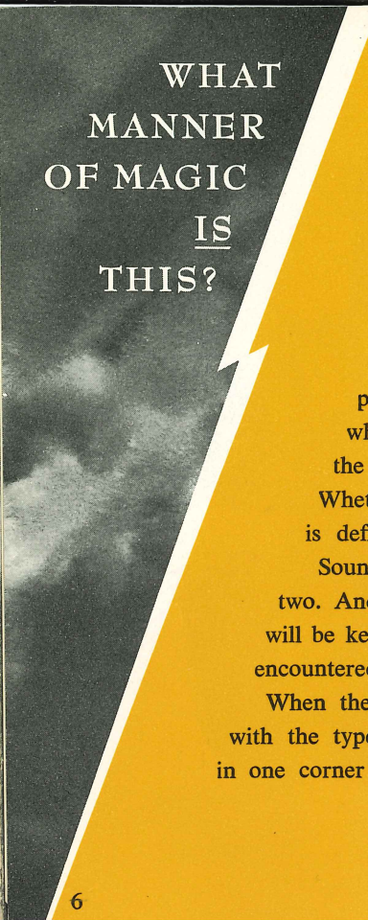

IRIS RING
FOCUSING SCALE
FILTER RETAINING RING
EMULSION SPEED SCALE
CAMERA SPEED SCALE
BOTTOM PLATE
FILM-PLANE REFERENCE MARK
FILM FOOTAGE WINDOW
DOOR
16 MM
BELL & HOWELL
Bell & Howell
AUTOMATIC EXPOSURE CONTROL
SPEED
10
16
25
32
50
16
24
32
64


CARRYING HANDLE
WINDING KEY
CAMERA SPEED DIAL
RELEASE BUTTON
VIEWFINDER OBJECTIVE
CAMERA LENS
ELECTRIC EYE
Bell & Howell
AUTOMATIC EXPOSURE CONTROL



WHAT MANNER OF MAGIC IS THIS?

Before going into operational details of your 200EE, let's see exactly what sets the lens automatically.

Below the camera lens on the front of the camera, you'll see another lens, on the face of which is a honeycomb pattern. This is the Electric Eye, and it transmits existing light to the photocell behind it. The photocell relays the light energy to a needle mounted on a shaft, just as occurs inside an exposure meter. As the needle is deflected to one side or the other by the impulse reaching it from the photocell, it closes an electrical circuit through a motor and the batteries which drive it. Finally, by means of gears, the motor rotates the iris of the camera lens, to open or close it as required by light conditions. Whether the lens iris is opened or closed depends upon which way the needle is deflected by the impulse from the photocell.

Sounds complicated. But it really isn't—and it all takes place in a second or two. And so long as you actually are shooting pictures, the camera lens iris will be kept set for proper exposure under all lighting conditions normally encountered in movie making.

When there simply isn't enough light for taking movies with the type of film you're using, you'll see a red flag in one corner of the viewfinder. So you stop shooting and avoid wasting your film.

FEATURES AND OPERATION OF THE 200EE.....

LENS. Your 200EE is fitted with a Bell & Howell Super Comat 20mm f/1.9 lens, in focusing mount. This lens offers you two distinct advantages, and here's why:

The focal length of a lens determines (a) its inherent depth of sharpness and (b) the angle of view it covers. The shorter the focal length the greater the inherent depth and the wider the viewing angle of the lens.

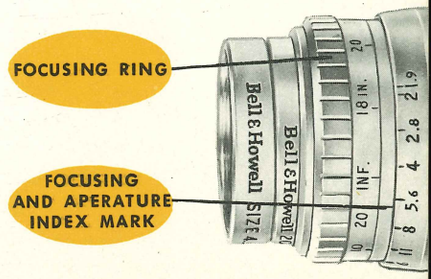
For many years the 1-inch (or 25mm) lens was considered "normal" for 16mm cameras. This is all well and good for the owner who plans to use several different lenses of various focal lengths—normal, wide-angle, and one or more telephotos, for example. But many people prefer the simpler method of having one lens on the camera and using that lens for all of their movie-making.

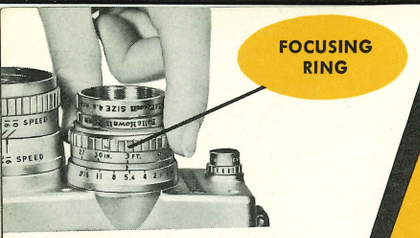
With this in mind, Bell & Howell engineers designed the 20mm lens, which has a focal length of about 4/5 inch instead of 1 inch. From what was explained a few sentences back, you can see how this slightly shorter 20mm lens affords you (1) greater inherent depth of sharpness and (2) a wider angle of view. Specifically, your 20mm lens "sees" 56 per cent more of a given scene than a 1-inch lens does.

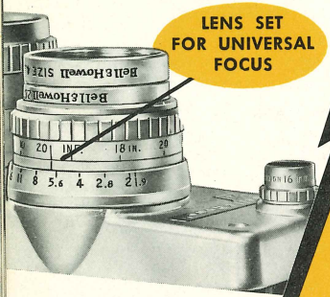
What about those times when you may want to get wide-angle or telephoto effects? Attachments for doing so are described on page 24.

Here's another fact you should know about your 200EE. In designing the camera, the viewing angles of the camera lens and the Electric Eye were matched as closely as optical considerations would allow. For this reason, the photocell scans much the same field of view as the lens itself in most circumstances.

NOTE: The lens on your camera was carefully adjusted to that particular camera at the factory. It is permanently mounted. Any attempt to remove it may throw it out of focus or force it out of line.





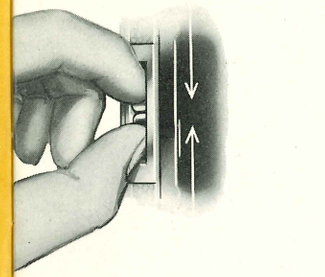


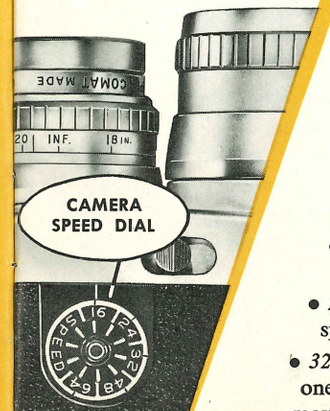
FOCUSING

The fluted FOCUSING RING is graduated for distances from 18 inches to infinity. To focus at one of the distances marked on the ring, turn the ring until that mark is exactly opposite the index mark on the barrel.

NOTE: You will notice a red mark between the 20-foot and infinity settings on the ring. When this red mark is set exactly opposite the index mark on the barrel, the lens is set for *universal-focus*. Careful focusing, by scale, is recommended when you're filming at distances under 10 feet. But where considerable fast action must be followed, and it is impractical to change focus frequently, you can use the universal-focus setting to good effect. In fact, a majority of your movie making can be done with the lens set at the universal-focus mark, with entirely satisfactory results. This fact, plus the presence of the automatic iris control, makes getting good movies with the 200EE almost as simple as pointing your finger.

FILM-PLANE REFERENCE MARK. Turn your 200EE over on its side with the winding key underneath. You will see a small circle broken by a straight line near the front of the camera. That is the *film-plane reference mark*. It indicates the exact position of the film inside the camera. This little mark becomes important when you're using the focusing ring. It acts as a reference point for measuring the exact distance from film to subject, especially important when taking close-ups.



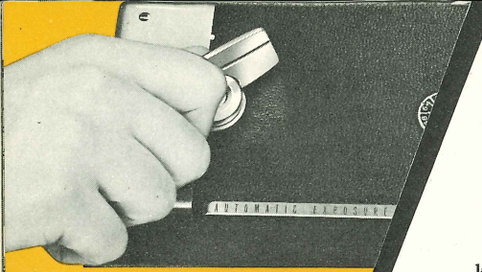


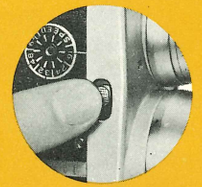
GETTING READY TO SHOOT

LOADING. Your Bell & Howell 200EE uses any black-and-white or color 16mm magazine film. Consult your B&H dealer as to what type is best suited to your needs. Magazine loading is quick and easy to use. It eliminates threading of the camera, protects film from accidental exposure to light, and affords easy interchangeability of different types of film at any time. A built-in safety feature of the camera prevents operation unless the film chamber door is securely closed. First open the camera door by pressing together the two latch-bars at the rear of the camera. Next insert the film magazine and push it firmly into place. You'll hear a "click" when it is seated correctly. (Never force a magazine in.) Close camera door. Now press the starting button downward very briefly a couple of times to be sure the film is being transported smoothly.

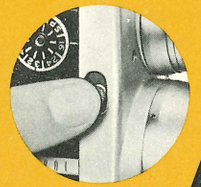
SELECTING CAMERA SPEED. The camera speed dial indicates the number of frames (pictures) exposed per second. An index mark in each dial segment indicates the exact setting point for each camera speed. To set the camera to run at the desired speed, rotate the dial until the correct speed index mark on it is aligned exactly with the dial index mark.

- *16 frames per second* is used generally for normal silent movies. *You will use this speed most of the time.*
- *24 frames per second* slows down the rate of action to two-thirds normal speed, and must be used when film is to be synchronized with sound later.
- *32 and 48 frames per second* will slow down the action to one-half and one-third normal speed, respectively. Use these speeds to film fast-moving sporting events, and for scenes taken from a moving conveyance.





PRESS INWARD FOR IRIS CONTROL ONLY



PRESS DOWNWARD FOR NORMAL OPERATION

• 64 frames per second is true slow motion. Use it to film fast-moving subjects when you want to record them in slow-motion —one-quarter their actual speed.

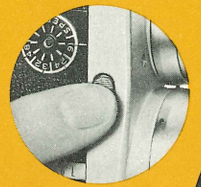
RATCHET-TYPE WINDING KEY. The ratchet key on your 200EE winds faster and easier than most other types of winding mechanisms. Hold the camera in one hand, grasp the key in the other. Now, as you hold the key firmly, rotate the camera backward and forward, repeating this motion until the spring motor is completely wound. When fully wound the motor will run off about 12½ feet of film. Do *not* let the camera run down completely if you can avoid doing so. And rewind the camera after each scene you shoot.

NOTE: Whenever the camera speed is changed, the lens aperture, or iris, must be reset accordingly to compensate for it. See SETTING THE CONTROL BARREL on page 12.

RELEASE BUTTON. The release button is located on the right-hand side of the front plate of your 200EE. Because of this location, we recommend that it be operated by the thumb of the right hand. **Press it directly inward,** and you operate the iris control switch *without* operating the camera motor. NOTE: Always press the button inward momentarily before pressing it downward to operate the camera. This will permit the automatic iris control to set the lens properly before you expose any film.

Press it downward slightly while continuing to press inward and you (1) start the camera motor and (2) operate the iris control simultaneously. As you can see, this is the coupled arrangement which provides automatic iris control while the camera motor is running.

PRESS DOWN FURTHER TO LOCK



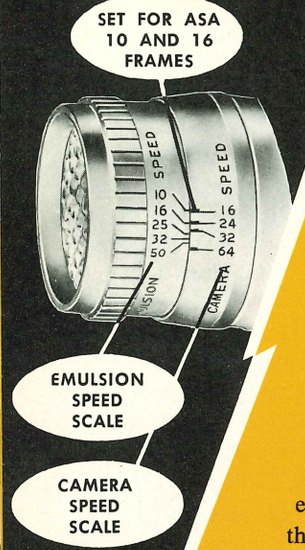
PRESS UPWARD FOR SINGLE FRAME

Press it down firmly and it locks the camera in running position. This allows you to get into the picture if you wish, when the camera is mounted on a tripod.

Press it upward for single-frame operation — taking one picture at a time. You'll use single-frame exposure only for animation work, when the position of the subject is changed slightly over a period of time and you want to film this action at timed intervals. When a series of such pictures is projected on the screen, the subject will appear to move. This effect is useful in titling, showing a travel route marked on a map, speeding up sunset sequences, and so on.

For single-frame work, set the camera speed dial at 16 frames. Now, since the camera shutter speed at single-frame is 1/32 second instead of the somewhat shorter interval of 1/43 second you get at 16 frames per second, you must act to avoid overexposure at single-frame. This is done by pressing the iris control switch inward to adjust the iris for proper exposure, then closing the lens one-half stop. (See page 18—SETTING THE LENS OPENING.) From then on, make it a point to press *directly upward* for your single-frame exposures.

NOTE: When the camera is carried in the Combination Case designed for it, the release button is protected against accidental pressure. But when placing the camera in a brief case, packing it for travel, or laying it down momentarily, be sure the release button is not in a position where it is—or can be—pressed inward. Such inward pressure can activate the control switch at a time when the iris ring may be pressed against another surface and cannot rotate. Under these conditions the control mechanism batteries can be run down rapidly. It's a simple matter to avoid any such occurrence—carry your camera in the case made for it, or lay it down with the release button facing upward.

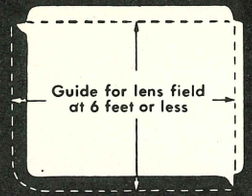


SETTING THE CONTROL BARREL. Some films are faster than others —they can "see" more light in a given length of time. To put it another way, a so-called "fast" film will be properly exposed in a given interval under poorer lighting conditions than a slower film will. This characteristic of film is called its *emulsion speed.* And the emulsion speed rating of a film is referred to in terms of its *ASA index,* a numerical designation arrived at according to American Standards Association procedure.

Example: The emulsion speed—or ASA index—of most color movie film is 10. It's very likely that most of your own filming will be done with ASA 10 film at 16 frames per second. Now, if for any reason you use a faster film—one rated at ASA 16, or 32, for example—the lens opening must be closed slightly to compensate, or the film will be overexposed.

Similarly, if you're using ASA 10 film and choose to work at a faster *camera* speed, the lens must be opened wider to prevent underexposure. Any film for instance, will get only half the exposure at 32 frames that it will at 16 frames.

By now you will realize that the automatic iris control of your 200EE camera must be pre-set for any combination of film speed and camera speed. And that's the reason for the two sets of numerals and index marks on the barrel of the ELECTRIC EYE. The fluted ring is indexed for *emulsion speeds* (in ASA ratings) from 10 to 50. The barrel adjacent to it is indexed for *camera speeds,* from 16 to 64 frames per second. (The camera speed scale on the barrel is not connected in any way with the camera speed *dial* on the camera body—setting one does not automatically set the other. This is advantageous, as we'll see later.)



To set the iris control for the desired combination, revolve the fluted ring until the mark denoting the emulsion speed of your film is aligned with the notch denoting the camera speed at which you are going to operate. The automatic iris control takes care of matters from there on in.

NOTE: The setting of the camera speed index mark on the barrel must match the setting of the camera speed dial on the side of the camera body during all normal use. Check this before shooting any pictures.

Since most of your filming probably will be done with ASA 10 color film at 16 frames per second, it might be well to set the iris control thus and leave it there. It can be locked in any chosen position by means of a set-screw which is found on the bottom of the camera front plate and immediately behind the camera speed ring. Your B&H dealer will perform the locking operation if you wish.

THE VIEWFINDER. Your 200EE is equipped with a viewfinder of the positive type, which means that the upright image you see through it will not shift even though your eye may accidentally shift at the eyepiece. Also, because a matching objective is used, the field you see is the same as that seen by the camera lens. The viewfinder objective is interchangeable with others in case you use the lens attachments made by Bell & Howell (see Page 24).

Correcting for parallax. When taking close-ups (at distances of less than 6 feet), allowance must be made for the fact that the viewfinder on your camera is located 1½ inches above and ⅝ inch to the right of the lens. Unless you allow for this, you are likely to cut off portions of the subject in your

picture. To compensate for this condition, which is known as *parallax*, the two notches you see in the viewfinder are used as a guide. The top notch indicates the upper left corner of the area being filmed, the bottom notch indicates the lower right corner. The dotted line in the diagram on page 13 shows the relative position of the area actually being filmed at less than 6 feet.

WHEN THERE'S NOT ENOUGH LIGHT FOR FILMING. As the lens approaches its widest opening (f/1.9), a red flag appears in the upper left corner of the viewfinder. This warns you that you are on the verge of underexposing your film. The indicator will prove useful in indoor photography, particularly when a light-bar is employed. Of course it's a big help outdoors, too, when you're filming early or late in the day, or in some area where there are deep shadows.

HOLDING THE CAMERA. Hold your camera exactly level when filming. Raise the camera and sight through the viewfinder eyepiece as shown in the illustration. Whatever holding method yields the greatest camera steadiness is the one for you to use. The carrying strap on the top of your camera can act as a guide for your hand while filming.

Keep hands and fingers away from the camera lens opening and the Electric Eye. Brace your elbows against your ribs, and rest the camera firmly (not rigidly) against your cheek. *Whenever possible, use a tripod for maximum camera steadiness*—your finished pictures will prove the wisdom of doing this.

MAKE YOUR FILM TELL A STORY! Your movies should tell a story—a story with continuity and interest.

Don't make a haphazard collection of pictures which have little relationship.

In order to film a connected, smooth-running story, shoot each scene for at least 7 seconds. A simple but surprisingly accurate way of gauging time is to count slowly "one thousand, two thousand," and so on, each count being about one second in duration. Length of scene should be governed mainly by the subject's action—film fast-moving subjects for a shorter period of time, landscapes and slow-moving subjects for a longer period of time.

PANNING. In order to show the relationship between two objects, or to take in a wide expanse of landscape or other scenic matter in one continuous scene, it is necessary at times to "pan"—that is, to revolve the camera horizontally while the scene is being shot. A tripod should be used for this wherever possible.

Set the camera to operate at 32 frames per second (and set the control barrel accordingly), to smooth out motion. Start panning with an object of lesser importance; then swing *slowly* to the most important object. Hold the camera steadily on the first view, pivot *slowly* from the waist; then hold the camera on the last view for two or three seconds before ending the scene. It's better to pan from left to right, as a rule. Never pan on close-up objects—you'll get a blur. When panning to follow a moving subject, keep it centered in the viewfinder.

Pan only when absolutely necessary. Most of the time you'll get better results by holding the camera still, taking a series of shots to tell the story.

WHEN YOU'RE READY TO BRANCH OUT...

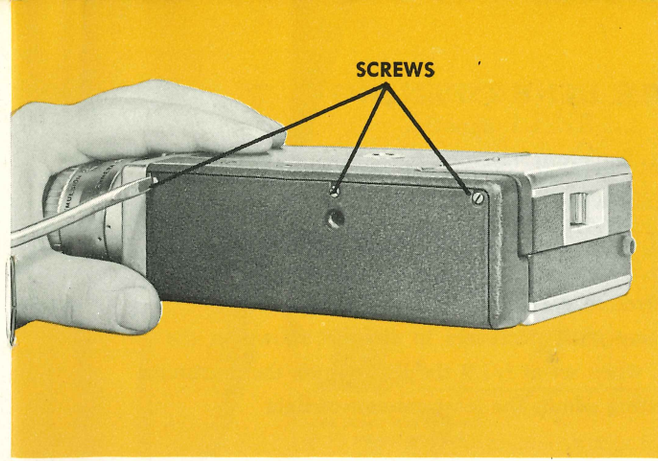
The simplicity of operation of your 200EE does not reduce its flexibility. In the next several paragraphs you'll learn what is meant by this.

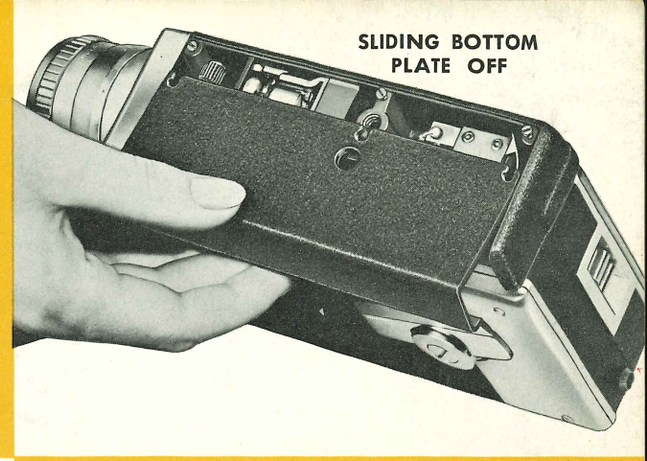
MANUAL IRIS OPERATION. The iris control can be rendered inoperative when you prefer to set the lens aperture manually for any reason. This is done in any of three ways, as follows:

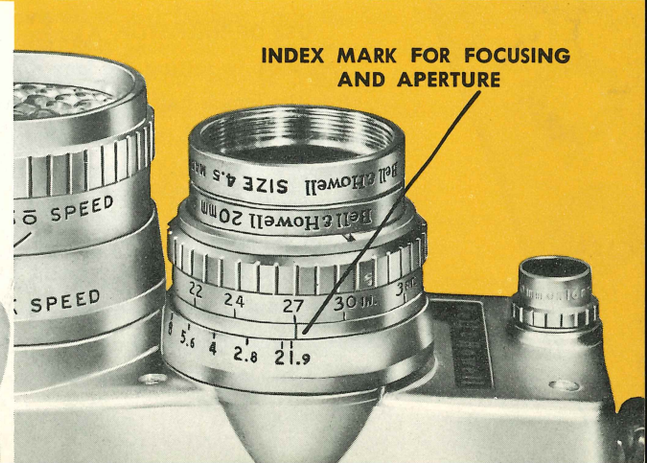
1. Manually turn the iris ring to the desired aperture setting. Hold it stationary with your left hand as you operate the camera with the release button in the normal way. (This method is recommended for occasional use, where only a few scenes are to be purposely under- or overexposed. It is *not* recommended for continued use, since it exerts excessive drain upon the batteries without giving them the normal period in which to "come back.") Or . . .
2. Loosen the three screws in the bottom plate of the camera, slide the bottom plate off, and remove the batteries. Or . . .
3. Remove the bottom plate as in Method 2, and insert a small piece of paper under the center battery contact.

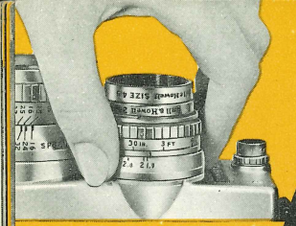
NOTE: The lens iris ring can be turned manually without damage when the iris control *is* connected—but when released it will return to the proper setting as soon as the control switch is pressed, unless held as in Method 1.

When disconnected from the iris control and operated manually, the lens is set by means of the iris ring. The latter is graduated in f/stops, from f/1.9 to f/16 (see page 18). The same index mark used for focusing serves as an index for aperture selection also.









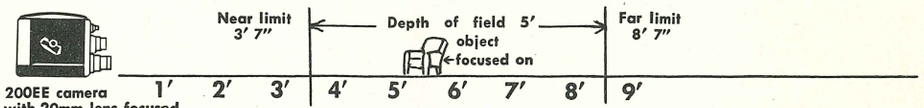
SETTING THE LENS OPENING

The amount of light passed by the lens to the film is controlled by the lens opening. Take a look at the lens on your 200EE. You'll see that the collar adjacent to the camera front plate is graduated for settings as follows: 1.9, 2, 2.8, 4, 5.6, 8, 11, and 16. These are the *f/stops* referred to previously. As the setting increases numerically, the lens opening itself decreases in size, as shown in the accompanying sketch. Thus, when set at f/1.9 the lens admits the maximum amount of light. The f/16 setting admits the least amount of light possible with this lens.

USE OF HALF-STOP. As mentioned on page 11, the use of half-stops becomes necessary in setting the lens manually for single-frame exposure. To open or close the lens a half-stop, simply set the scale midway between any of the markings from 2 through 16. Example: Original lens setting is f/4. One half-stop wider would be between the 4 and the 2.8 marks. A half-stop smaller would be between the 4 and the 5.6 marks. In case the iris control has set the lens at a point somewhere between two of the numerals, then to arrive at a half-stop simply turn the collar the equivalent of half the distance between two numerals. Accurate manual setting of the iris of the lens on your 200EE camera is rendered unusually easy because the spaces between f/stop markings are equal. This is not always the case, even among other fine quality lenses.

DEPTH OF SHARPNESS WITH YOUR 20mm LENS...

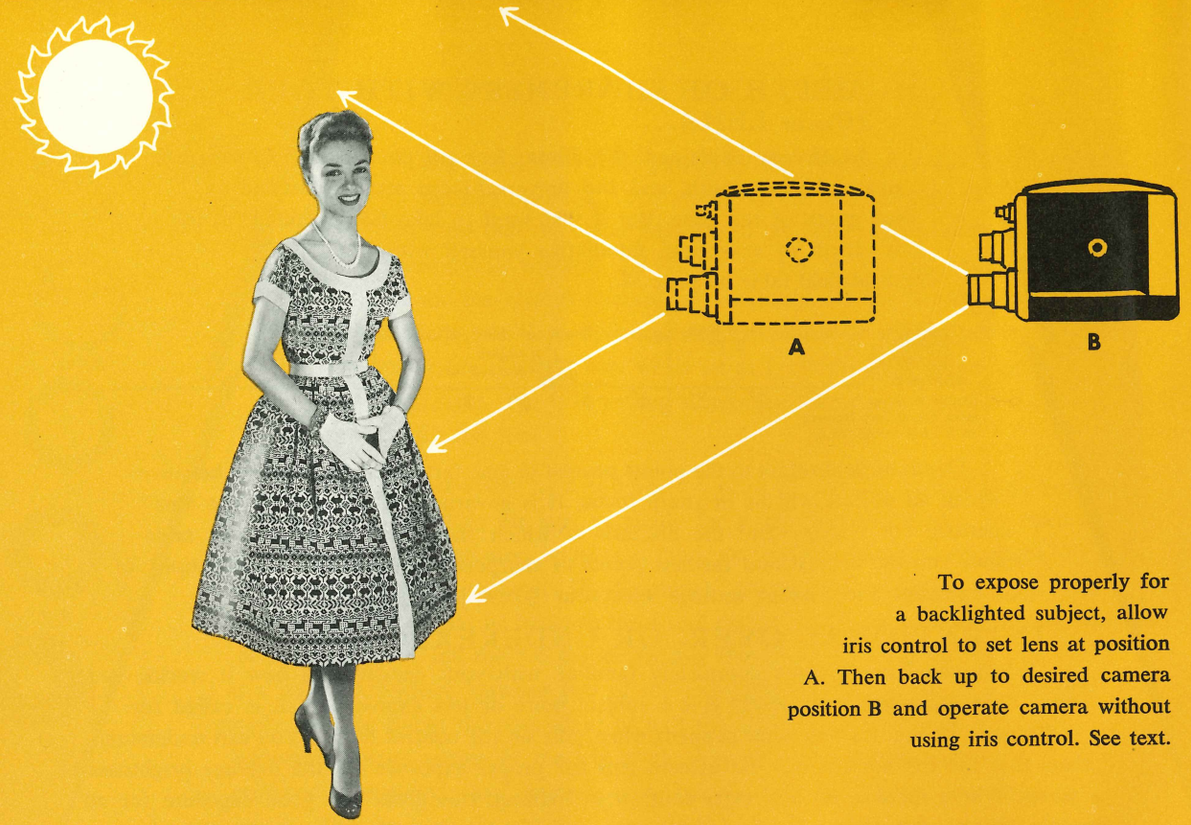
As already explained, the 20mm lens on your 200EE camera has great inherent depth, and the universal-focus setting thus can be used much of the time. But if you want to take full advantage of the lens' depth of sharpness, familiarize yourself with the depth-of-field table on page 32.



Depth of field refers to the points nearest to and farthest from the lens between which all objects will be in sharp focus. It is governed by the size of the lens aperture (or f/stop) and the distance at which the lens is focused. The table shows you the nearest and farthest points of sharpness for different combinations of lens openings and footage settings with your 20mm lens.

INTENTIONAL OVER- OR UNDEREXPOSURE

When you have become completely familiar with your camera and how it works, you may have occasion to purposely give a subject more or less exposure than is called for. On page 12 you learned what happens when you set the control barrel. You can understand, then, that the iris control sets the camera lens for proper exposure for the *average* brightness of a scene. Where there is no abnormal contrast in lighting, this gives you good exposure for all portions of the picture.



To expose properly for a backlighted subject, allow iris control to set lens at position A. Then back up to desired camera position B and operate camera without using iris control. See text.

But if you have a scene which includes extreme contrast between light and dark areas, and you want to preserve detail in either a very bright area or a very dark one, there are a couple of tricks which will help. Your main purpose here is to get proper exposure of the *subject itself,* without worrying about the surrounding area. To put it another way, in such cases you will have to underexpose or overexpose some portion of the scene in order to get proper exposure of your main subject.

There are three ways of purposely over- or underexposing the film *without disconnecting the iris control,* as follows:

1. *Overexposure* by one lens stop will result if you set the control barrel as though the film had an *ASA index only half its actual value* (by changing the setting from ASA 32 to ASA 16, for example). Since the barrel is not graduated in settings below ASA 10, this routine won't work when you're using ASA 10 film, of course. Instead, you can set the control barrel for *twice the camera speed* being used (from 16 to 32 frames, for example), leaving the speed dial on the *camera* set right where it is. In this way the control will act to produce what normally would be considered overexposure, and you will pick up the desired detail in a *small dark area.*

To preserve detail in a *small bright area* in an otherwise fairly dark scene, set the control barrel as though your film had an *ASA index approximately twice its actual value*—from ASA 10 to ASA 25, or from ASA 16 to ASA 32, for example. Again, you must leave the *camera* speed dial set as is. This produces what normally would be *underexposure,* and thus will pick up detail in the bright area.

To expose properly for small bright area surrounded by dark area, set control barrel for under-exposure as described in text.

This method is recommended when you want to obtain uniform over- or underexposure throughout several scenes. The iris control will be operating constantly and will thus give you the uniformity of exposure you need.

2. You can leave the control barrel set normally, and instead reset the lens aperture manually *after* the control has positioned it properly for correct exposure. To do this, take aim at your subject in the usual way, pressing the release button directly inward so that the control switch operates while the camera mechanism does not. When the lens has been set by the iris control, hold the iris ring to keep it from turning while you shoot.

In this case, opening the lens wider than the control takes it will produce overexposure. Closing it down will give you underexposure.

Use this method—and Number 3, below—in shooting those brief sequences where exposure compensation is wanted for just a short time.

3. Basically like Number 2, above, this method is especially effective when your main subject is to be filmed at fairly close range. Approach your subject closely, aiming the camera directly at it. Press the release button inward to set the iris for the subject without including the background or other surrounding area. Now return to the point from which you want to shoot. Film your sequence as you manually keep the iris ring from moving, as previously described. In this way you will expose your subject properly (see page 20), whether it be lighter or darker than the background.

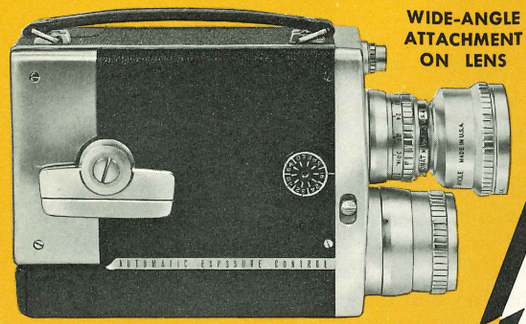
WHEN YOU'RE FILMING INDOORS...

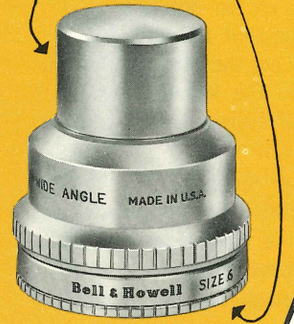
WITH A LIGHT-BAR. Set the control barrel for the ASA index of the film being used, and focus the lens for the proper distance. Load and wind the camera. Turn the lights on, then with the release button pressed directly *inward* move toward the subject until the red flag disappears from the viewfinder (or move even closer if you wish). *Keep your subject further from the camera than it is from the background.* The reason for this is to prevent the photocell from viewing a considerable amount of darker area around the subject. Should this happen, the iris control will automatically average out the strong illumination on the subject and the weaker illumination on the background. It will set the lens accordingly, which will result in overexposure of the subject, and you don't want this.

On the other hand, when you keep subject and background illumination at approximately the same level, as recommended, the iris control won't have to cope with contrasting illumination, and a good over-all exposure will result.

WITH FLOODLAMPS. When you're using portable floodlamps, try to obtain so-called "flat" lighting, with a minimum of shadows. As in the case of the light-bar (see above), keep your subject fairly close to the background, and for the same reason. If you see the red flag in your viewfinder, use more lights, or move the lights closer to the subject. In doing so, be sure that no lights or lighting equipment appear in the viewfinder.

WITH A CONVERSION FILTER. When using a color conversion filter indoors, set the control barrel at the ASA index recommended by the film manufacturer for that condition. Since your 200EE is a magazine-load camera, there never is any necessity for using daylight-type color film under artificial light (with the considerable loss in emulsion speed this causes). Instead, you have only to change magazines as needed.





FILTER FACTORS
BLACK-AND-WHITE FILM

When a filter is used with black-and-white film, you must allow for the *filter factor,* or amount of exposure increase required for a given filter. Since most filters used with black-and-white film hold back part of the existing light from the film, they require more exposure at a given camera speed. The amount of overexposure required is known as the filter factor. Where twice normal exposure is required by the filter, its factor is 2, and so on.

All you need do is to reset the control barrel. Simply divide the ASA index of the film you're using by the filter factor and set the barrel accordingly. Example: You are using an ASA 50 film with a filter whose factor is 2 (called a 2X or 2-time filter). Divide 50 by 2 and you get 25—so set the control barrel emulsion speed ring to ASA 25. The automatic iris control takes care of the rest.

The 20mm lens on your 200EE camera takes a Size 4.5 filter.

LENS ATTACHMENTS

The f/1.9 Super Comat 20mm lens on your 200EE was designed to take the Bell & Howell auxiliary lens attachments. Both of these screw into the internal threading at the front of the lens barrel, and thus cannot be jarred loose or drop off when mounted. NOTE: The filter retaining ring *must* be removed before either attachment is installed.

WIDE-ANGLE ATTACHMENT. This attachment reduces the effective focal length of your 20mm lens to approximately ½ inch, and thus is extremely useful when you must film from close quarters and still include a certain area in the picture. Use of the attachment requires that you replace your 20mm viewfinder objective with a ½-inch objective, so that you will see the same area the camera's optical system views.

With the Wide-angle attachment in place, set the camera lens focusing ring at the universal-focus point on the scale as described on page 8. This will afford satisfactory sharpness. However, if you wish to focus more accurately, at short subject distances, you can use the focusing ring on the camera lens—but bear in mind that *now the distance actually focused upon will be just under half the distance shown on the ring scale.* Example: With the focusing scale set at 20 feet, you actually have the lens focused sharply at just under 10 feet with the Wide-angle attachment in place.

The Wide-Angle attachment takes a Size 6 filter.

TELEPHOTO ATTACHMENT. This attachment magnifies the image approximately 2 times. Thus, in combination with your 20mm lens it gives you an effective focal length of about 40mm, or 1-3/5 inches. In using it, you must replace your 20mm viewfinder objective with a suitable objective, so you'll see the same field of view as the camera's optical system includes.

Like the Wide-angle attachment, the Telephoto attachment has no focusing scale of its own. Your focusing is done with the camera lens itself. Instructions for converting the actual scale reading are furnished with the attachment.

The Telephoto attachment takes a Size 7 filter.

MAINTENANCE

KEEP YOUR CAMERA CLEAN! To clean the interior of your 200EE, open the camera door, then remove any dirt which may have collected around the photographic aperture. Use a camel's-hair brush for this. *Never use sharp tools.* Dislodge hardened dirt with a swab of lens-cleaning tissue moistened with a *little* alcohol. Brush out the film chamber. Once in a while it's a good idea to blow all dust and foreign matter out of the film chamber, using a rubber ear-syringe for the purpose.

Clean the front surface of the lens with lens-cleaning tissue moistened with a little Bell & Howell Opti-Kleen lens-cleaning fluid. Opti-Kleen is recommended for use on any optical glass surfaces, coated or uncoated. Use it on the viewfinder eyepiece objective and eyepiece, Electric Eye surface, Wide-angle and Telephoto attachments, and any filters you may have, also.

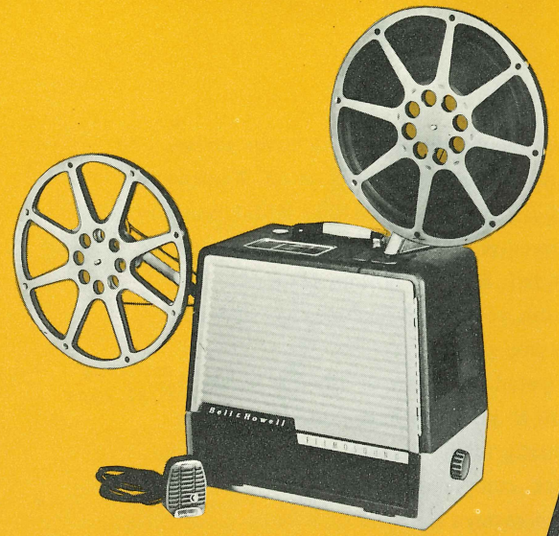
BATTERIES. The battery drain in operating the iris control is very slight. As soon as the batteries start to lose their energy, there will be a very noticeable decrease in the speed at which the iris control works.

To replace the batteries, loosen the three housing cover screws at the bottom of the camera and slide the bottom plate off. Remove the batteries and replace them with six Mallory RM-1R or RM-1 mercury cells. Face all batteries in the same direction, with the battery buttons facing toward the front of the camera, as illustrated. Replace bottom plate.

New batteries can be obtained from your B&H dealer. They also can be purchased wherever hearing aids are sold.

LUBRICATION. Your camera is lubricated for one year when it leaves the Bell & Howell factory. Do NOT attempt to lubricate it yourself. Keep it in top-notch condition by returning it annually to the factory, your B&H dealer, or a B&H Approved Service Station, for complete servicing.

NOTE: Whenever the bottom plate of the camera must be removed for replacing batteries or for temporarily rendering the iris control inoperative, make it a point to replace the plate as soon as possible. Whenever the plate is off, take every precaution against allowing dust or other foreign matter to get inside the camera. Faithful adherence to this practice will avoid fouling the electrical contacts in the iris control system.



FILMOSOUND 302

MAGNETIC RECORDING PROJECTOR

- 2000-foot capacity . . . full hour show
- reverse and still-picture projection
- projects silent, optical sound or magnetic sound films
- 1,000-watt concentrated-filament lamp

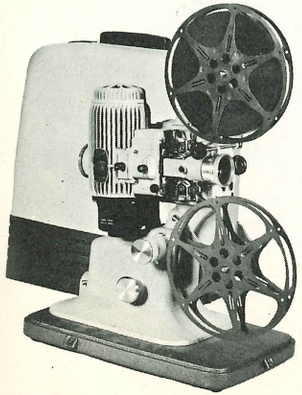
MAKE YOUR *OWN* SOUND MOVIES!

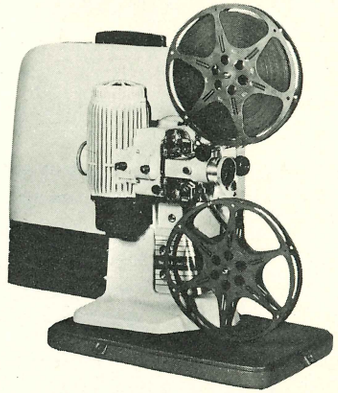
Add sound to your own 16mm movies, with the Filmosound 302—the 16mm projector that records sound on your films as you project them, then plays back your own sound immediately. You'll find countless uses for your soundfilms—family movies with family voices on the soundtrack, business, church, PTA, club, and other films. Put sound on your *old* 16mm silent films, too. Ask your Bell & Howell dealer about the Filmosound 302—get started right away on giving your own movies the professional touch that only sound-on-film can produce.

Bell & Howell DIPLOMAT

16mm SILENT PROJECTOR

The finest 16mm silent projector made. Full 400-foot capacity lets you enjoy a quarter-hour show of your movies at their best. Smooth, dependable all-gear drive. Reverse and still-picture projection.





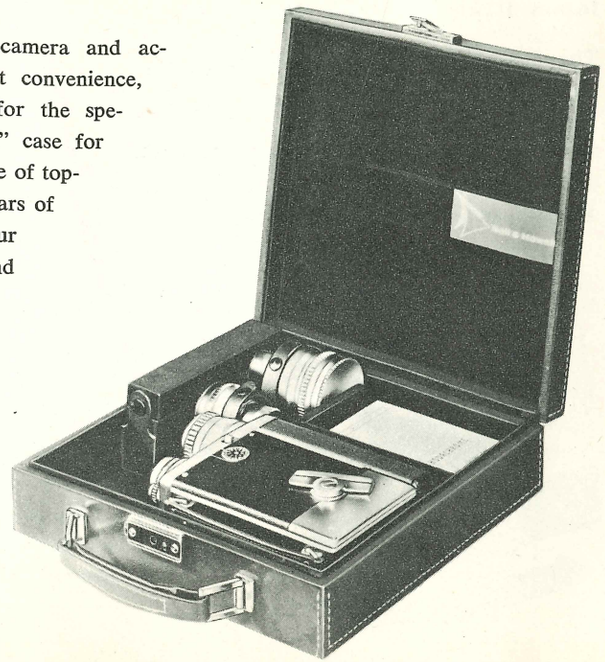
Bell & Howell STATESMAN

16mm SILENT PROJECTOR

An economical projector that offers you flicker-free movies, brighter and larger than life. Easy to thread and operate, the Statesman fully protects your valuable film, brings you many advanced features. Reverse and still-picture projection.

COMBINATION CASE FOR YOUR 200EE

For protection of camera and accessories, plus utmost convenience, there's no substitute for the specially-designed "dispatch" case for your 200EE. Sturdily made of top-grain black cowhide for years of hard wear, the case holds your 200EE camera, Wide-angle and Telephoto attachments and viewfinder objectives, filters, and spare film. Can be used with a shoulder-strap if you wish, too.



SHUTTER SPEED COMPARISON CHART

The following table gives the corresponding shutter speed for each of the camera speeds of the Bell & Howell 200EE.

CAMERA SPEEDS	SHUTTER SPEEDS
16 f.p.s.	1/43 second
24 f.p.s.	1/65 second
32 f.p.s.	1/86 second
48 f.p.s.	1/129 second
64 f.p.s.	1/172 second
Single-frame	1/32 second

DEPTH-OF-FIELD TABLE
for 20mm f/1.9 Focusing-mount Lens

Object Area Height	Object Area Width	Best Focus		F = far limit of sharpness; D = depth of sharpness; N = near limit of sharpness						
				f/1.9	f/2.8	f/4	f/5.6	f/8	f/11	f/16
20°	27°	Infinity	N	34′2″	23′2″	16′3″	11′8″	8′2″	6′	4′2″
7′1″	9′6″	20′	F	48′	145′	Inf.	Inf.	Inf.	Inf.	Inf.
			D	35′4″	134′	Inf.	Inf.	Inf.	Inf.	Inf.
			N	12′8″	10′9″	9′	7′5″	5′10″	4′8″	3′6″
3′6″	4′9″	10′	F	14′1″	17′5″	25′8″	68′10″	Inf.	Inf.	Inf.
			D	6′4″	10′5″	19′5″	63′5″	Inf.	Inf.	Inf.
			N	7′9″	7′	6′3″	5′5″	4′7″	3′10″	3′
2′5″	3′3″	7′	F	8′9″	9′11″	12′1″	17′2″	47′11″	Inf.	Inf.
			D	2′11″	4′6″	7′2″	12′9″	44′1″	Inf.	Inf.
			N	5′10″	5′5″	4′11″	4′5″	3′10″	3′3″	2′8″
1′9″	2′4″	5′	F	5′10″	6′3″	7′2″	8′7″	12′7″	29′1″	Inf.
			D	1′5″	2′1″	3′4″	5′	9′5″	26′4″	Inf.
			N	4′5″	4′2″	3′10″	3′7″	3′2″	2′9″	2′4″
1′5″	1′10″	4′	F	4′6″	4′10″	5′3″	6′	7′9″	11′8″	95′11″
			D	11″	1′5″	2′	3′	5′	9′3″	93′10″
			N	3′7″	3′5″	3′3″	3′	2′9″	2′5″	2′1″
1′	1′4″	3′	F	3′4″	3′5″	3′7″	3′11″	4′8″	5′10″	10′4″
			D	7″	9″	1′	1′6″	2′5″	3′9″	8′6″
			N	2′9″	2′8″	2′7″	2′5″	2′3″	2′1″	1′10″
10″	1′2″	30″	F	2′8″	2′10″	3′	3′2″	3′6″	4′2″	6′
			D	4″	7″	10″	1′1″	1′7″	2′4″	4′5″
			N	2′4″	2′3″	2′2″	2′1″	1′11″	1′10″	1′7″
9″	1′	27″	F	2′4″	2′6″	2′7″	2′10″	3′1″	3′6″	4′9″
			D	2″	5″	7″	11″	1′3″	1′10″	3′3″
			N	2′2″	2′1″	2′	1′11″	1′10″	1′8″	1′6″
8″	11″	24″	F	2′1″	2′2″	2′3″	2′5″	2′7″	2′11″	3′8″
			D	2″	4″	6″	8″	11″	1′5″	2′3″
			N	1′11″	1′10″	1′9″	1′9″	1′8″	1′6″	1′5″
7¼″	9¾″	22″	F	1′11″	2′	2′1″	2′2″	2′4″	2′7″	3′2″
			D	2″	3″	5″	7″	10″	1′2″	1′10″
			N	1′9″	1′9″	1′8″	1′7″	1′6″	1′5″	1′4″
6½″	8¾″	20″	F	1′9″	1′9″	1′10″	1′11″	2′1″	2′3″	2′8″
			D	2″	2″	4″	5″	8″	11″	1′5″
			N	1′7″	1′7″	1′6″	1′6″	1′5″	1′4″	1′3″
5¾″	7¾″	18″	F	1′7″	1′7″	1′8″	1′8″	1′10″	1′11″	2′3″
			D	2″	2″	3″	4″	6″	8″	1′1″
			N	1′5″	1′5″	1′5″	1′4″	1′4″	1′3″	1′2″

Bell & Howell GUARANTEE

This new Bell & Howell product is guaranteed to be free from imperfections in both material and workmanship for one year from date of original purchase. Should any part of this equipment be defective, it will be replaced or repaired free of charge (except for transportation), provided the equipment has been operated according to the instructions accompanying it.

No liability is assumed for film which is damaged or is unsatisfactory for any reason and no liability is assumed for interruptions in operation of equipment. This guarantee is void:

a) If equipment has not been registered with Bell & Howell (please use card supplied);

b) If equipment has been damaged by accident or mishandling;

c) If equipment has been serviced by other than Bell & Howell approved service stations;*

d) If adaptations or accessories other than Bell & Howell have been made or attached.

The foregoing is in lieu of all other warranties express or implied and Bell & Howell Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with this product.

**Location of nearest approved service station will be furnished on request.*

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